Vol. XLV. JUNE. 1901.

AMERICAN SOCIETY OF CIVIL ENGINEERS.
INSTITUTED 1852.

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No. 889.

CANALS BETWEEN THE LAKES AND NEW YORK.

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PRESENTED NOVEMBER 7TH, 1900.

WITH DISCUSSION.*

The reports of the New York Canal Commission on a barge canal between Buffalo and Albany, and of the United States Commission on ship canals 21 ft. deep and 30 ft. deep between Buffalo and New York, giving estimates of cost and other information, enable us, by gauging the probable benefits to be derived from them, to judge the merits of each of these enterprises.

There are advocates who sincerely believe that railroad transportation is cheaper than transportation in narrow waterways. Their opinion is based on the undoubted fact of the abandonment of many canals, and on State subventions received by others which are not abandoned but are doing an increasing business.

The notion that the free play of economic forces would induce private enterprise to build canals, as railroads are built, if they would really furnish a cheap means of transportation, has still great influence on many minds, and creates at least a prejudice which must be

*This paper was discussed with that of Mr. Wisner (page 224). The joint discussion will be found on pages 240, *et seq.*

overcome before they are willing to vote in favor of taxes for their construction.

There are also various enthusiasts, anti-monopolists, and other enemies of railroads, who are in favor of anything that they believe will destroy the monopoly of the latter, regardless of any careful weighing of costs and advantages to be gained.

One erroneous argument, often used by advocates of water transportation, consists in a direct comparison of average freight rates on the Lakes and ocean with the average freight rates of railroads. The average freight rate on the railroads of the United States was in 1899 0.724 cent per ton-mile, while the average freight rate on the Lakes and Atlantic was until recently about one-tenth as much. This comparison, however, is misleading, since a very much larger percentage of the lake freight consists of crude materials than is the case with railroad freight. On the Lakes, ore, grain, coal and lumber form the bulk of the freight, and it would be more correct to compare the average freight rate on the Lakes with the average freight rate on railroads for these articles only.

The average haul on the Lakes and Atlantic is very much more than on railroads; this is another reason why ton-mile rates are lower by water than by rail, since the average rail rates include expensive short-haul freights as well as through freights. If allowance is made for these differences it is found that the freight rate per ton-mile on the Lakes and Atlantic is about one-fifth and not one-tenth of the ton-mile rate charged by railroads for similar freight transported over similar distances, with favorable grades, which latter are always obtainable along water routes.

To obtain the average rates for water transportation it is necessary to take a number of years into consideration, since the variations from year to year are much larger than on railroads. Recently, all freight rates by water were excessively high, from transient causes, but it is certain that they will shortly recede to the level of the last few years, and probably lower, in consequence of the larger and more economical steamers which are now being built. This ratio of charges of 5 to 1, however, does not quite represent the ratio of cost, since the railroad charges include interest and profit on capital invested in line and terminals and the cost of their maintenance, while the terminal facilities of waterways, and the interlake channels with their lighting,

are partly provided by the public without charge, and therefore, the cost incurred ought to be added to the freight rates by water in the proper proportion to obtain a fair comparison with railroad rates.

The endeavor will be made in this paper to show that the arguments based on past experience with canals are inconclusive, and to give the real reason why private capital cannot safely undertake the construction of the canal here considered and count with certainty on receiving the benefits derived from it. It is a necessary condition for the success of human intercourse that he who confers a benefit on others receive an equivalent benefit in exchange. Wherever there is free competition between those providing the different kinds of benefits or goods, and between those desiring them, this offers the means of ascertaining what are equivalent benefits or what is the relative value of different goods.

Where such competition is absent it is extremely difficult, if not entirely impossible, to ascertain what would be an equivalent benefit for a service rendered, or, in other words, what would be a fair charge for the same.

On account of this impossibility of ascertaining what is a fair charge for services which in consequence of their nature exclude competition, public opinion is fluctuating on this point. In any business which is a monopoly seriously affecting the welfare of a very large number of people who can easily co-operate politically, interference with the liberty of charging what the traffic will bear must always be feared, and the probable profits can therefore not be estimated. All those benefits which can be rendered at very much reduced cost, if manufactured on an extremely large scale, limit or entirely exclude competition. All means of transportation belong to this class. A highway will facilitate transportation, and the cost of the unit of benefit rendered by it falls rapidly with the amount of traffic. A fair toll on a highway privately owned would be such as would give an equal return to the capital invested in its construction as that obtained by capital invested in competitive enterprises of equal risk, and managed with the same amount of skill.

This needs only to be stated to show the impossibility of ascertaining what is a fair toll when the highway is constructed without sufficient public control to show the amount of capital really expended,

not to speak of the difficulty of judging the risk and the skill used in the enterprise.

So many interests are affected by the amount of the tolls collected on highways, and the usefulness of a highway is so much reduced by the collection of uniform tolls of any size, that highways, where they have been built by private enterprise, have mostly been expropriated and the tolls abrogated.

Private railways are not quite as precariously situated as either highways or canals.

In a rapidly developing country, if a State regulates the railroad charges so that they pay no fair return on the capital invested, railroad building or improvement of facilities is stopped, and this is soon felt to be such an obstacle to further growth that public opinion becomes more favorable to railroads, and permits them to profit by the increase in traffic. It is further evident that competition very largely influences many railroad charges; they are therefore not arbitrary, and in consequence there is a strong element in public opinion advocating that they be left alone, which succeeds in greatly tempering public interference.

It is felt more and more that the only fair way to fix the compensation of the various factors contributing to the creation of public benefits outside the range of competition is to induce the capitalists to furnish their contribution, not by promising them the net earnings which they might get by managing the enterprise and charging what the traffic will bear, but by promising the smallest rate of interest for which the capital is obtainable in the open market, and compensating the various grades of labor by wages and salaries in the same manner as the capitalist would have to do. The *entrepreneur* is in this case the public, which is then at liberty to charge for the services rendered whatever is thought most advantageous for the public welfare.

A private company which would propose to build a canal between the lakes and New York would, in the present state of public opinion, probably be unable to obtain a charter, and, should it obtain one, it would be so entirely at the mercy of the public, in respect to the charges which would be permitted, that it probably could not raise the necessary capital.

The proposed project, if we consider now that recommended by the United States Commission, of a canal 21 ft. deep and 215 to

250 ft. wide at the bottom, through the Niagara River from Buffalo to Lasalle, thence by eight locks to Lewiston, then through Lake Ontario to Oswego, from there to Lake Oneida and through the Mohawk Valley to the Hudson, is a waterway that would permit free access from all the Lakes to the ocean, for vessels 550 ft. long, 58 ft. beam and 19 ft. draft; it would make them available in winter, and would thereby reduce cost of local transportation on the Lakes; it would connect the harbors serving the most productive regions of the United States with each other by an unobstructed waterway, avoiding transfer of freight from lake vessels to canal boats, and from these to ocean steamers.

There are only three waterways which approach this one in the nature and magnitude of the services rendered—the Suez Canal, the Sault Ste. Marie Canal and the waterway between Lakes Huron and Erie. While the Suez Canal saves thousands of miles of distance, or the two transfers and a short railroad haul, which would be necessary in its absence, the three other canals of this class save transfers at each end which, with the attendant charges or costs, the delays in loading and unloading, and the risks of damage to goods, are economically considered equivalent to thousands of miles of distance.

Isolated canals suffer from the disadvantage that their cheap transportation is overbalanced by the necessity of transfers for all the freight either coming from or going to points which they do not reach. They might be called transfer canals, while the four canals above grouped together are transit canals.

The canals of Europe, where they are successful, are parts of large systems, thereby increasing the number of points accessible without transfer; they stand, therefore, more nearly on an equal footing with railroads in this respect. They form an intermediate link between the isolated canals creating transfers and the canals connecting large systems of water transportation which save transfers.

This difference is sufficiently important to vitiate all inferences drawn from the failure of canals of one class to the prospects of those of another.

The cost of running a vessel though the proposed ship canal between Buffalo and New York is no mystery. The practicable speed is known by experience with other canals of similar dimensions. Leaving for later consideration the interest on cost of canal and its

operating expenses, it is sufficiently accurate to say that the cost per ton-mile of running a vessel through the canal is larger than that on the lakes in the proportion that the time required to pass through the canal is larger than that for an equal distance on the Lakes. The speed of the newer freight steamers on the Lakes is about twelve miles per hour; the speed through the St. Clair flats canal, of dimensions similar to those of the canal proposed between the Lakes and the Hudson, is over eight miles per hour, as found by actual measurements by the United States Canal Commission. To estimate the increase in cost of transportation due to this reduction in speed it is important to separate the total cost of transportation into two parts, the one due to the running of the vessel, which increases as the distance, and the other due to the expenses at terminals, which is dependent on the number of trips, and is not materially affected by an increase in the time spent while running. For trips between the Upper Lakes and Buffalo not more than two-thirds of the expenses of vessel owners are incurred for running the vessels between terminals. The ship canal between Buffalo and New York, proposed by the United States Canal Commission, has 102 miles of canal of standard section and 96 miles of canalized river in which the bottom width varies between 250 and 1 000 ft. If we assume for the whole length of restricted channel, amounting to 198 miles, a speed of 8 miles an hour, which can be exceeded in some parts of it, the time required for passing through this channel would be 24.75 hours, or the same as would be required for a distance of 297 miles on the open Lakes, an increase over actual distance of 99 miles. The delay caused by the 37 lockages would be equal to 23 hours, which would be sufficient to cover 276 miles in the open Lakes. The time required for going from Chicago to New York, an actual distance, *via* the proposed canal, of 1 367 miles, would be the same as that required for covering a distance of 1 742 miles on the open Lakes.

The average charge on the Lakes for low-class freight between Chicago and Buffalo was, in the years before the recent abnormal rise, below 50 cents a ton, of which 33.3 cents only is due to the distance to be covered, and 16.7 cents is due to terminal expenses incurred by carrier. If these terminal expenses of carrier remain the same, the only increase in total freight charge to New York over that to Buffalo will be due to the increased time required in going from Chicago to New York instead of to Buffalo. The increase is as 890 miles to 1742

miles, and the charge for transportation proper would, therefore, be 65.3 cents per ton instead of 33.3 cents. If we add to this the charge of 16.7 cents due to terminal expenses of carrier, we obtain 82 cents per ton as the probable future charge for low-class freight from Chicago to New York. This is at the rate of 0.60 mill per ton-mile for the actual distance of 1 367 miles.

This rate is nearly identical with the rate per ton-mile between Chicago and Buffalo ruling before the recent rise in lake freight rates, and corresponding to 50 cents a ton between the latter points.

This illustrates the great advantage of the absence of transfers; the terminal expenses, being distributed over a greater number of ton-miles, decrease the total rate per ton-mile as much as it is increased by the slower speed on the canal.

Any comparison of actual ocean, lake or railroad rates between points of widely varying distances will show, other things being equal, that the ton-mile rate decreases with the distance. Between San Francisco and Europe the ton-mile rate falls sometimes to 0.03 cent for grain and 0.02 cent for coal returning; while between New York and Europe ton-mile rates twice as high prevail. This clearly shows that a large percentage of the freight charge is due to terminal expenses.

The above rate of 82 cents per ton, Chicago to New York, is the charge toward which the actual freight rate might be expected to gravitate, after the profits in the business, which would at the beginning probably be excessive, should have fallen to a normal amount. The same rate, increased by 4 cents per ton for every hundred miles distance from New York, might be expected to rule between Chicago and places beyond New York.

Six days would be the time required for the transport of through freight between Chicago and New York.

This quick time, and the absence of transfers, would have the effect that a large amount of high-class freight could be secured, for which the present charge is, by rail, $6 to $15 per ton, according to class.

The freight charge for wheat, Chicago to New York, corresponding to the above rate of 82 cents per ton, is 2.46 cents per bushel. Through the present Erie Canal the charge for wheat, Chicago to New York, was in 1898, 4.82 cents per bushel. The saving would therefore be 2.36 cents per bushel in comparison with the cheapest and slowest

method of transportation now available. Since the freight tonnage of the New York State canals is only about 5% of that of the railroads crossing the State, it is more reasonable to compare the charges for freight through the new canal with the lake and rail and with the all-rail rates now existing between Chicago and New York. The lowest average lake and rail rates for wheat ruled in 1898, when they were 5.4 cents per bushel. The lowest average all-rail rate is given at 10 cents per bushel; 6 cents per bushel has, however, sometimes ruled from Chicago to the seashore.

In comparison with lake and rail rates, the saving on the new canal, offering far better service, would be 2.94 cents per bushel.

For wheat going to points on the Atlantic coast which cannot be reached by present canal boats, or to Europe, the transfer in New York could be avoided by the use of ocean steamers loading at upper lake ports. Not only the transfer charges in New York would thereby be saved, but the costs due to the loss of time of both carriers engaged in the transfer, and the total saving in comparison with present charges for transport from upper lake points to all points beyond New York and immediate vicinity, would be over 5 cents per bushel, or $1.67 per ton.

Advocates of a barge canal between New York and Buffalo lay much stress on the low cost of barges and lake vessels per ton of carrying capacity in comparison with ocean steamers, and by assuming that an ocean steamer or lake vessel would have to go at the rate of 4 miles an hour between New York and Buffalo, and would remain as long at terminals as a canal boat, they figure out advantages for a shallow canal with the present system of transfers. Their assumptions are, however, not justified by the facts. The disadvantage of ocean steamers arising from the necessity of a stronger hull than is required for lake steamers, and from the use of surface condensers has been greatly exaggerated by comparing the cost of fast and durable ocean steamers with that of much slower and short-lived lake steamers, without making allowance for these differences. The difference in cost that does exist in this respect is overbalanced by the fact that the ocean steamer can run for 12 months in the year, while the lake steamer is limited to an open season of 8 months. The interest charge per month of running time is therefore less for an ocean steamer than for a lake steamer of equal carrying capacity, equal speed and durability.

A lake steamer can give only transient employment to its *personnel*

during a season of the year when wages are high, while the ocean steamer can give permanent employment, and obtains, therefore, a cheaper service.

Ocean freight rates are, in consequence, rather lower than freight rates on the lakes. Canal boats costing only $8 per ton carrying capacity could not safely go beyond the canal. They would obtain in a barge canal a speed of only 4 miles per hour; the thereby increased cost of labor per ton-mile, and the delays due to transfers of freight more than balance the advantages gained by lower interest charge.

Should a canal of the kind proposed by the United States Canal Commission be built, the through freight business between the lake points and transatlantic countries would be done largely by medium-sized ocean steamers, while lake steamers and coasting vessels would do the through business between lake points and the Atlantic coast harbors, and barges might be used for local business. Even the local business done in barges could be done much cheaper in a ship canal than in a barge canal, because the practicable speed in the former would be twice that in the latter.

In regard to the amount of business which could be expected for such a canal, it need only be mentioned that were it finished now, 200 000 000 bushels of wheat and its products, and 250 000 000 bushels of corn, or 12 250 000 tons in these two items alone, would probably be transported through it in an average season. Adding to these, other grains, ore, coal, lumber, salt, stone, cement and the large amount of high-class freight which might be expected, it is evident that 20 000 000 tons is a low estimate of the probable freight per year shortly after its opening.

The traffic of the Sault Ste. Marie Canal has doubled every six years during the last twenty-four years; it was 25 000 000 tons in 1899. If we compare the productivity and population, or the tonnage visiting the harbors at both ends of the Sault Ste. Marie Canal, with those at both ends of the canal between the lakes and New York, we can hardly believe that the latter will have a smaller amount of freight than the former.

The Detroit River has at present an estimated traffic of over 40 000 000 tons. There can be little doubt that the more eastern canal, having the whole lake region at one end and the coasts of the Atlantic at the other, would soon reach and exceed this amount.

A comparison of the traffic of 8 500 000 tons of the Suez Canal, connecting a population of 700 000 000 in the East with one of 400 000 000 in the West, with the traffic of the interlake waterways, which mainly serves the trade of a population of only 40 000 000, gives a striking illustration of the small amount of trade between distant old world nations in comparison with a fraction of the internal trade of a part of the United States.

The internal trade of the United States is more than ten times its foreign trade. The internal transportation costs about twenty times as much as that for the foreign trade. This explains why these internal waterways secure such an enormous traffic in comparison with the population they serve. By far the largest part of the traffic through a canal between Buffalo and New York would be traffic between the Atlantic coast harbors of the United States and the interior of the country.

There can therefore be no doubt that the saving in cost of transportation would benefit the United States principally. The only benefit Europe would derive from it would follow after the higher prices for grain in the West had so stimulated production as to largely increase exports, and reduce European prices in consequence, and after the decreased prices of European products in the West had increased the demand for them, so as to produce a rise of prices in Europe.

Since the canal cannot be finished before six years have elapsed, any estimates of its traffic based on the present business of the interlake channels would have to be increased at least 50%, since this increase may reasonably be expected in their traffic during this time. It would therefore be advisable in construction to make provision for duplicating the locks in the near future.

The capacity per season of the canal proposed by the United States Canal Commission is 36 000 000 tons; its estimated cost, inclusive of deepening of interlake channels to 21 ft., is $200 000 000.

Allowing one-eighth of the cost for interest during construction, and taking interest at 3%, the yearly cost would be $6 750 000, plus the cost of maintenance, which latter is estimated at $2 350 000 per year.

A very moderate toll, in comparison with the saving in cost of transportation, would cover all expenses incurred by the nation. The

saving to the public in freight charges would probably average $1.50 a ton in consequence of the advantages which uninterrupted and quick transportation would offer to high-class freight.

The whole district, not alone along the canal, but the whole lake and Atlantic coast of the United States, would thereby become unequaled in its accessibility to raw materials and markets. The lake basin, having the cheapest steel of any shore, would then become the principal shipbuilding center of the world.

The rapid increase of business on the Lakes, as well as through this canal, would undoubtedly create a demand for greater depth in the lake harbors and larger cross-section in the interlake channels and in the canal, and this prospect should be kept well in view during the planning and construction of the same.

It might even be advisable, considering the improvements in lake channels and harbors which may be expected during the next twenty years, to build the canal 24 ft. deep, instead of selecting dimensions which will be just sufficient for accommodating the vessels which will exist in the Lakes at the time of its completion. This would give, from the beginning, the advantage of permitting greater speed than would be possible on the smaller canal. The larger locks to accommodate the vessels on this larger canal would also give a larger carrying capacity, which will almost certainly be needed before twenty years of its operation have expired.

To sum up: The ship canal between the Lakes and New York proposed by the United States Commission is a transit canal connecting without transfer two large systems of important harbors; it is therefore in the class of canals which have been most successful in the past.

It connects the two most productive regions in the world, and will therefore soon have a traffic equal to the proposed capacity of 36 000 000 tons a year.

The yearly cost of the canal will be $9 100 000, which is about 25 cents per ton of freight which will soon pass through it.

The saving in cost of transportation will average about $1.50 per ton in comparison with the cost of equally good service at present available. Most of this saving will accrue to the United States, which should therefore undertake its construction.

A toll adequate to cover all the cost will not materially interfere

with its usefulness, and will serve to distribute justly the burden of the expense on those who gain by its construction.

There is at present under way a survey for a barge canal of 12 ft. depth, the cost of which has been estimated at about $59 000 000 by the New York Canal Commission. It is proposed that the State of New York shall build it for the purpose of securing its commercial supremacy. The route is that of the present Erie Canal, with some deviations; the estimated capacity is 20 000 000 tons per season. It is hoped that the transfer charges at Buffalo and New York will be largely reduced in consequence of the building of such a canal. It is estimated that the saving in cost of transportation through the whole length of this canal, in comparison with the cost through the present Erie Canal, will be 61 cents per ton, which would, in the opinion of the Commission, amply compensate the State for its expenditures for construction and maintenance. It is not proposed to levy any tolls.

The difference in the cost of transportation on the present and improved canal is calculated by estimating the cost, running expenses and carrying capacity per season, of a new style of barge, with which there is no practical experience, and comparing this with the actual cost of transportation through the present Erie Canal.

This method is evidently subject to a great many errors, even if used by investigators who are not in any way prejudiced in favor of a particular result.

An illustration of the amount of difference between facts and estimates of this kind is furnished by the estimate made by Major Symons, M. Am. Soc. C. E., of the New York Canal Commission, on page 81 of a report to the Chief of Engineers of the United States Army in 1897, on a canal between Buffalo and New York. He there gives ten as the practical number of round trips per season between Buffalo and New York for a vessel of 20 ft. draft, in a canal 24 ft. deep, on the Oswego route. The United States Canal Commission gives sixteen as the practicable number of round trips per season between Chicago and New York, for a vessel of 19 ft. draft in a canal 21 ft. deep, on the Oswego route. This latter estimate is based on careful observation of the actual speed of similar vessels in a canal of the same dimensions as the one proposed between Buffalo and the Hudson, on the observed speed in the open Lakes, and on the actual performances of lake vessels. This gives

15 days 7½ hours for one round trip, of which 6 days are required for the forward and return passage between Buffalo and Chicago. This leaves 9 days 7½ hours as the time required, according to their estimate, for one round trip between Buffalo and New York, and would permit twenty-six round trips per season between these points, with 3 days to spare in the average open season.

The practicable number of round trips is the most essential element in all the estimates of cost of transportation in various kinds of canals between Buffalo and New York, made by Major Symons.

This throws considerable doubt on the accuracy of his calculations of the saving in cost of transportation to be expected from an improved barge canal.

But let us assume, for the sake of argument, that the estimate of the New York State Canal Commission, of the difference in cost of transportation in the present and the improved Erie Canal, is correct, and let us investigate whether the conclusion drawn therefrom, that it is advisable for the State of New York to execute the improvement, is justified by the premise.

If the public provides, at its own cost, a new means of transportation, or an improvement in an old one, cheapening cost of transport by a certain amount, various freight will be transported that would not have been transported at all in the absence of the improvement, and other freight is deflected from other means of transport, though the advantage thereby secured may be very trifling, but just sufficient to turn the balance in its favor. It is therefore a serious error to estimate the advantage to the public achieved by an improvement in the Erie Canal, by multiplying the difference in cost of transportation per ton in the old and new canal with the number of tons passing through the new canal, and subtracting therefrom the expenses incurred by the public for construction and maintenance. This method is only correct for freight which would pass through the Erie Canal in its present condition. This tonnage of the present Erie Canal is constantly decreasing, in consequence of the continually falling railroad rates.

The average saving on freight, either newly created or diverted from other transportation lines, will be liberally estimated if assumed to be 0.6 of the amount of 61 cents, or 36.6 cents per ton.

If the taxpayers of the State of New York are expected to provide

an improvement, it is reasonable for them to ask whether their benefit from it is likely to compensate them for the expense. An improved Erie Canal, lowering the cost of transport and the transfer charges, would undoubtedly largely increase the amount of freight passing through it, originating at, and destined for, points outside New York, but the saving on this part of its freight traffic would only slightly benefit New Yorkers.

Of the freight, either exported from New York State or imported into the State through the canal, half the saving in cost of transport might be expected to represent the benefit to New Yorkers. The following method will, therefore, give the balance of advantage and expense of an improved barge canal from the standpoint of New Yorkers.

Take the whole saving on the present amount of local freight of canal originating at, and destined for, points in New York State. The average distance traversed by this freight on canal is not known, but will not be underestimated if taken to be three-fourths of its length. The saving on this freight would therefore be three-fourths of 61 cents, or, say, 46 cents per ton.

Take half the saving of cost of transportation on the present canal business originating in, or destined for, points in New York State. If we estimate the distance traversed by this freight on canal as three-fourths of its total length, the saving to New Yorkers on this freight would be 23 cents per ton. For new business created by the improvement take 0.6 of the amounts above given.

Neglect the through business originating at, and destined for, points outside the State. Then compare the sum of advantages so obtained in one year with the yearly expenses incurred for maintenance and interest on cost of improvement. If there is a large surplus on the right side the State may be justified to commit the unavoidable amount of injustice which lies in collecting taxes in proportion to assessed value of property while the benefits are very unequally distributed among the whole population.

Should the total freight carried by the canal be equal to its capacity of 20 000 000 tons, the freight with origin and destination outside New York would be at least 10 000 000 tons; the remainder, not more than 10 000 000 tons, would partly have both origin and destination in New York, and partly only one of them. We can only

guess at the relative amount of these two parts; we shall therefore take them to be equal.

Of these latter two parts about one-eighth would have to be taken as the successor of the corresponding freight on the present Erie Canal.

The saving for New Yorkers would, therefore, be as follows:

On 625 000 tons of freight corresponding to the freight on the present Erie Canal, with origin and destination in New York, 46 cents per ton, equal to	$237 500
On 625 000 tons of freight corresponding to freight on present Erie Canal, with either origin or destination outside New York, 23 cents per ton, equal to	118 750
On 4 375 000 tons of new freight, with origin and destination in New York, 0.6 of 46 cents, or 27.6 cents per ton, equal to	1 207 500
On 4 375 000 tons of new freight, having either origin or destination in New York, 0.6 of 23 cents, or 13.8 cents per ton, equal to	603 750
The total saving to New Yorkers, due to the cheapening of transportation on the improved Erie Canal, if the tonnage on the same were equal to its capacity, would therefore be	$2 167 500

We have estimated that 10 000 000 tons would be through freight, saving two transfers, or benefiting by reduction in cost of two transfers, probably partly the one and partly the other; and 5 000 000 tons would be freight benefiting by reduction in cost, or avoidance of one transfer. Half of the benefit from reduction in transfer cost on these 5 000 000 tons would accrue to New Yorkers.

The present cost of these transfers is 70 cents per net ton for two transfers; if one-half of this cost were saved the New Yorkers would benefit to the extent of $437 500.

If we add this amount to the saving in the cost of transport, we obtain $2 605 000 as the possible saving which might be obtained for New Yorkers through the improved canal, should its business be equal to its capacity.

Against this stand the interest charges on the money spent on the improvement and the cost of maintenance, which latter may be estimated at $1 500 000 per year. The estimate of cost of the improve-

ment is $59 000 000. This does not include interest during construction and the first years of use, when business would be much smaller. If we add 12% to the estimate of cost on this account, we obtain $65 600 000 as the actual cost to the taxpayer; 3% interest on this is $1 968 000.

The yearly cost would therefore be about $3 468 000, against a benefit to New Yorkers of $2 605 000.

Should the business of the canal be only 10 000 000 tons, which seems to be the estimate of the New York State Canal Commission, the total benefit to New Yorkers would be about $1 500 000, at a cost more than twice the amount.

The above does not pretend to be an accurate estimate, as that is impossible; it is only intended to prove that even if the difference in cost of transportation on the present and improved Erie Canal were 61 cents per ton, if the improved canal would secure all the freight it could carry, and if it would be the means of reducing transfer charges one-half, none of which favorable assumptions is either proved, or even probable, the State of New York would not be justified in undertaking the improvement at its own cost.

This whole question must be looked at, not from the narrow point of view of the State of New York and its particular interest, but from that of the interest of the United States. Modern trade is regardless of State boundaries, and it is impossible to benefit the State without benefiting the Union, or to benefit the Union in this matter, without benefiting New York State.

By the fact that every point along the canal is practically a harbor, or can easily be made one, the State must always profit, as a center of manufactures, by any improvement in its waterway, more than either the shores of the Lakes or the Atlantic, since only comparatively few points along these shores, namely, those with harbors, are put in direct communication by this waterway.

The main service of this waterway does not consist in cheapening transportation along its course, though this also will be accomplished more efficiently by a ship canal than by any other, but in removing the necessity of transfers at both ends.

The present transfer charges are only the smaller part of the total cost incurred on account of these transfers. Transfer or transit means all the difference between slow and inefficient service, excluding all

except the lowest class freight, and in great danger of losing even this on account of the rapidly falling rail freight rates, and quick, safe and reliable service, by through transportation lines, at such low cost as to be beyond the reach of railway competition, either in quality of service or price for the same, between all the points which can be directly reached.

A ship canal between Buffalo and New York means the creation of one great system of water transportation out of two of half the size; it means that each harbor of each of the two systems will have on an average twice as many points to which it can ship directly by water as it had before. Its opening will be the signal for a renewed period of rapid increase in the shipping of the Atlantic coast as well as the lakes.

A toll of 20 cents a ton for each transfer saved by the freight passing through this canal would not amount to more than one-quarter of the benefit derived from this saving, if the improvement in quality of service made possible thereby is properly valued. It would cover all expenses incurred by the nation.

Since the main reason for the large cross-section of canal, and the great expense caused thereby, is the saving of transfers, it would be just to charge tolls in proportion to the number of transfers saved.

The proper course for New York State is, therefore, to abandon its policy of desiring a canal all by itself, and to join in hearty co-operation with the other interests desiring a ship canal.

If it refuses to do so, there is serious risk that the various interests which are principally concerned in having the cheapest possible communication between the West and Europe, will join forces to build a ship canal from the Lakes to Montreal, which could be built at a cost quite commensurate with the services rendered thereby; though these would not compare with those rendered by a canal through New York, which would also serve the much larger and more important trade between the West and the East of the United States.